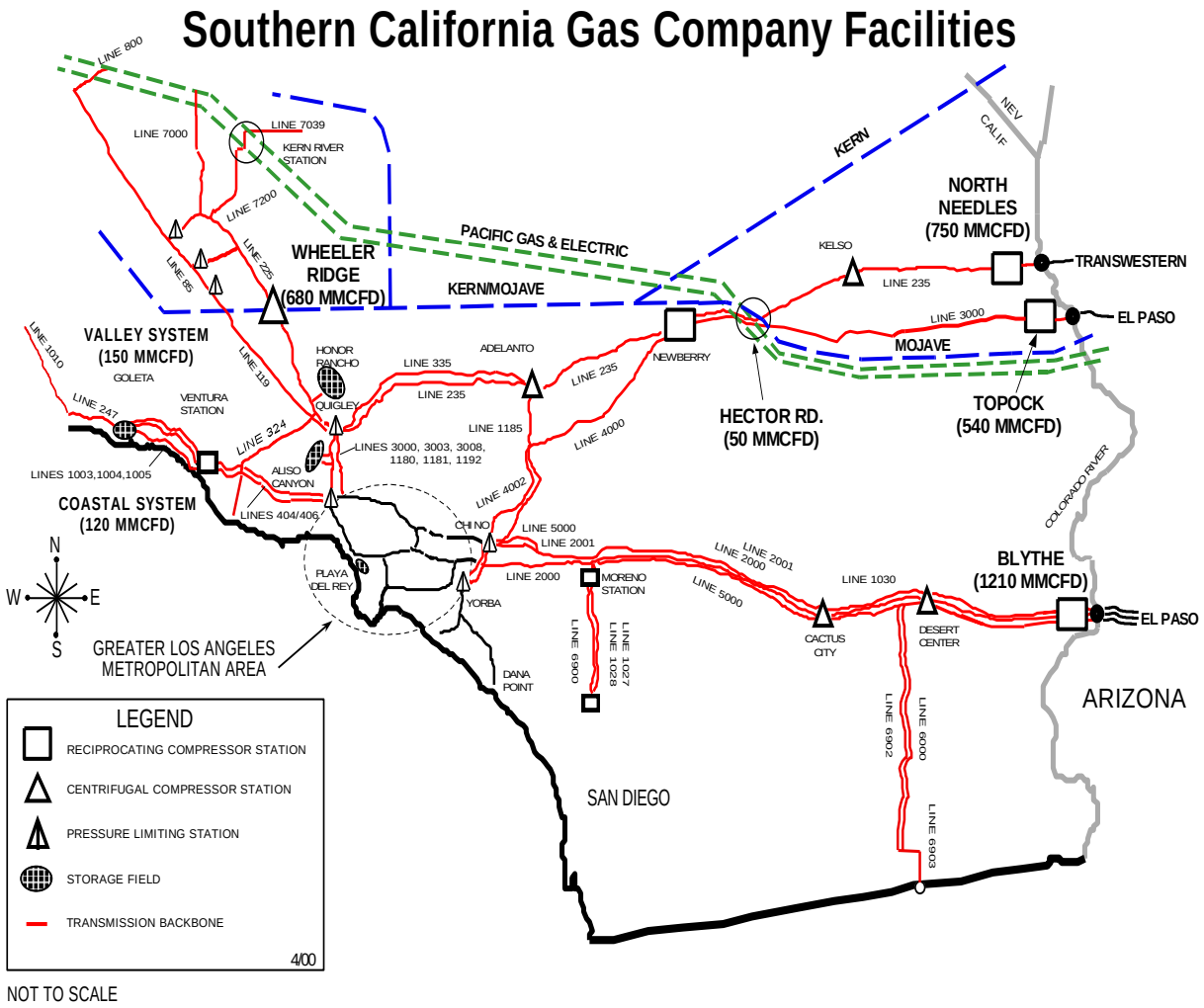
HYDROGEN AND RENEWABLE GAS RESEARCH

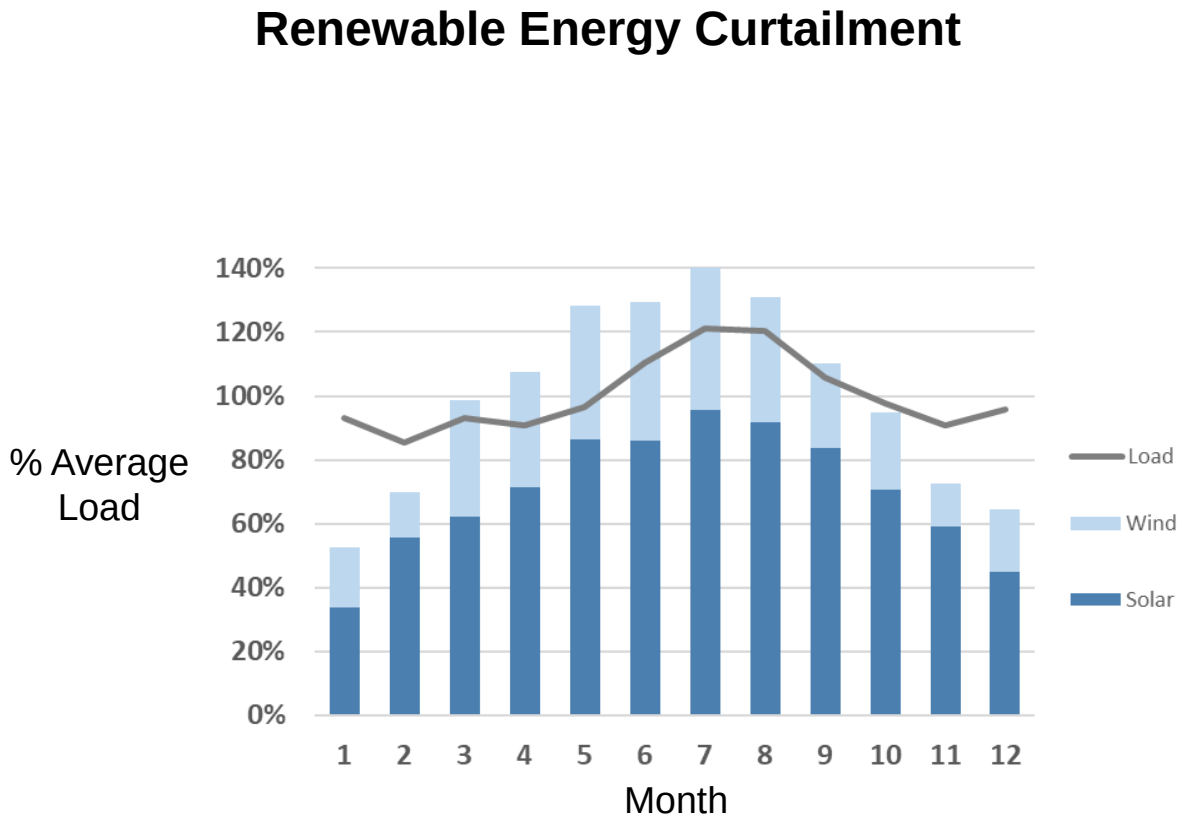
Sample of Projects

CPUC Workshop, August 20, 2019

SoCalGas Transmission, Storage and Distribution System



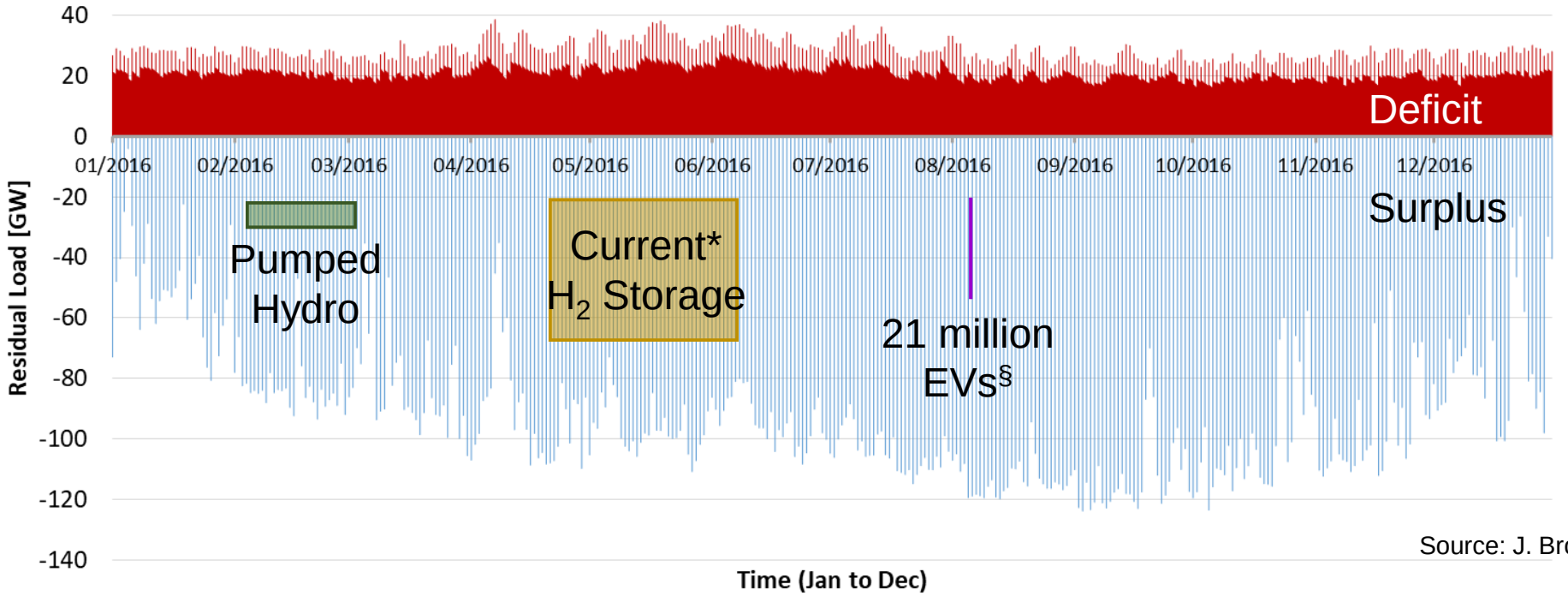
H2 Blending/Injection Research
UCI – SoCalGas Partnership



Source: J. Brouwer, UCI

Why Hydrogen Blending?

Recent 1-Year Simulation of 1Mostly Solar power
162 GW solar capacity, 5.6 GW wind capacity 100% Renewable Grid in CA



Source: J. Brouwer, UCI

*Using existing natural gas resources for hydrogen storage

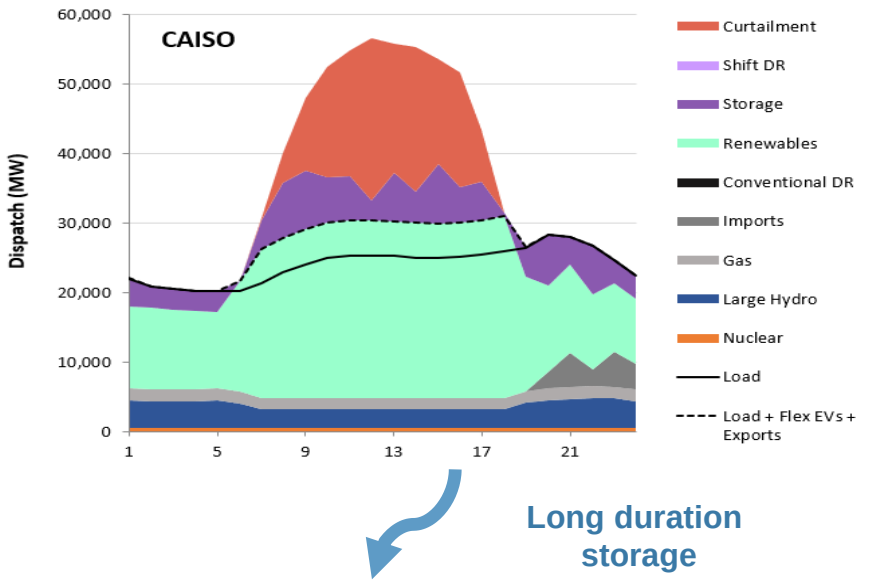
§ 21 million = total CA registered light duty vehicles; Nissan Leaf battery

UCI/SoCalGas Partnership
Assessing Natural Gas Grid as a Long Duration Storage Resource

Project Goals

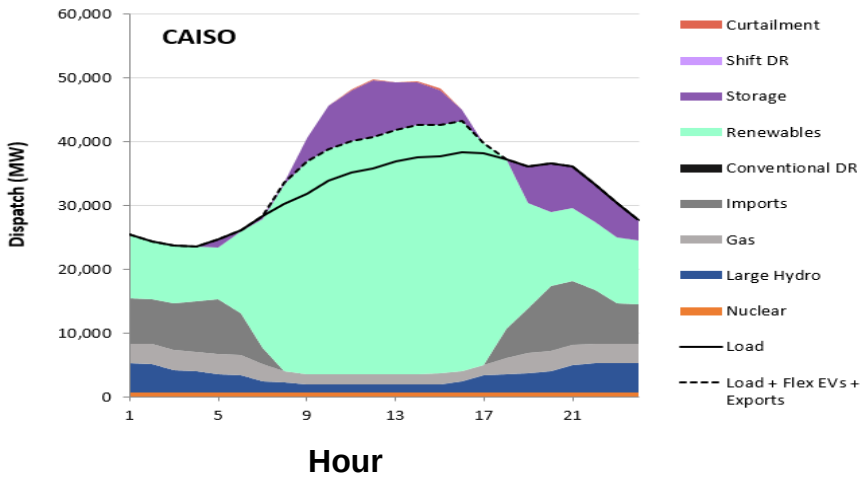
- **Quantify the need for long-duration storage (12 hours and longer) on the future California electric grid**
- **Assess the relative feasibility and techno-economics of power-to-gas using the natural gas grid to serve that need**

RESOLVE 80% Renewables – May Day



Long duration storage

RESOLVE 80% Renewables – July Day



UCI Partnership
Hydrogen/NG Blending Study

Project Goals

- Develop a certified LCFS pathway for electrolytic hydrogen blended on the natural gas system
- Assess the economic feasibility of such a pathway
- Support the development of a SoCalGas-approved blending system design

P2G + Methanation @NREL

- Project
  - 250 kW PEM electrolyzer (5 kg/hr H_2)
  - 700 liter vertical stirred biomethanation reactor
  - Up to 18 bar pressure and 75°C
- Biomethanation Benefits
  - Reduces curtailment of renewable power
  - Enables greater renewables penetration
  - Avoids the challenges of hydrogen blending
  - Captures and recycles biogenic CO_2 emissions
  - Replaces “blue” gas with “green” gas
- Goals
  - Demonstrate efficient pipeline quality gas production under varying hydrogen production from various solar PV production profiles
  - Develop and test process optimization and cost reduction strategies
- Tasks
  - Parametric testing campaigns
  - IP development: close electrolyzer/reactor integration
  - Communications and outreach

SoCalGas A Sempra Energy utility®